

## EARTH DAY 2006

**J**oin us at **Hugh MacRae Park** on **Saturday, April 22nd** from **noon-6pm** for the annual **Earth Day Celebration**.

This year's event will feature 30+ environmental exhibits, a Kid's EcoZone and games, the Funky Junk Contest, oyster shell recycling, live music and much more!

Food and organic beer will be available from Mellow Mushroom and Tidal Creek Co-op and local bands will play everything from funk to bluegrass. It's a great day to learn about the local environment and have fun too! *This is a rain or shine event.*



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### Developments Win Prestigious Stewardship Awards

Two local development projects received awards recognizing their extraordinary efforts to preserve and protect our area's natural resources. Woodsong in Brunswick County and Preservation Park in New Hanover County received the first annual Lower Cape Fear Stewardship Development Awards.

The awards were given by the Lower Cape Fear Stewardship Development Program which honors development projects in New Hanover, Pender and Brunswick counties that demonstrate outstanding environmental stewardship through protection, conservation, improvement and awareness of our natural resources. Applications and presentations were judged by an independent committee consisting of experts from the Nature Conservancy, UNCW Center for Marine Science, UNC Coastal Studies Institute, Cape Fear River Watch and Keep America Beautiful. For more information about the program, please visit [www.stewardshipdev.com](http://www.stewardshipdev.com).

#### Woodsong ([www.villageofwoodsong.com](http://www.villageofwoodsong.com))

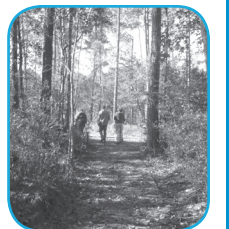
##### Outstanding Recognition Award

Woodsong received the highest award for their efforts to preserve existing habitat, limit impervious surface area, promote water conservation, protect water quality and educate the community.

Located off Highway 17 near Shallotte, the community of Woodsong incorporated many of the site's natural features into the design including a children's park, a neighborhood green, pocket parks, a constructed wetland, nature trails, a preserved wetland forest and rare carnivorous plants.



This environmentally-sensitive community includes homes featuring plentiful windows to view the woods, habitat and other natural features of the property. According to Buddy Milliken, founder of Woodsong and owner of the Milliken Company, "I wanted to preserve the natural landscape because I believe it is the essential element of the overall human habitat."



#### Preservation Park ([www.worsleyrealestate.com](http://www.worsleyrealestate.com))

##### Significant Achievement Award

Preservation Park received the second level award for their plans to preserve extensive wooded areas and wetlands. Located at the intersection of Park Avenue and Sebrell Avenue in Wilmington, Preservation Park will feature a nature trail, community garden, preserved wetland, educational signage and green building techniques.

By preserving trees and greenspace, clustering houses and using narrow streets and sidewalks, the development is preserving a total of two acres of natural and wetland areas on the three acre site.

Elise Rocks of the Worsley Investment & Development Company said, "The site itself was the inspiration for the project with the existing wetland habitat and extensive woodlands."

Preservation Park will be eligible to apply for the Outstanding Achievement Award as the project progresses.



## Stormwater Watch Newsletter

Winter/Spring 2006 ~ Annual Water Quality Report Issue

## Stormwater Services

Stormwater Services maintains and improves the public drainage system for the protection of our community and the environment.



Earth Day  
Celebration  
Sat, April 22, 2006  
Hugh MacRae Park  
Noon-6pm

**WILMINGTON**  
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## The State of Our Waterways

### 04-05 Wilmington Watersheds~Water Quality Report



The following water quality summary was furnished by Dr. Michael Mallin of the UNCW Center for Marine Science. Dr. Mallin is the lead scientist for the Wilmington Watersheds Project. Water quality data are presented from a watershed perspective, regardless of political boundaries. For more information, visit: <http://www.uncwil.edu/cmsr/aquaticceology/laboratory/>

#### WATERSHED

Barnards Creek

Bradley Creek

Burnt Mill Creek

Greenfield Lake

Hewletts Creek

Howe Creek

Smith Creek

Whiskey Creek

#### DRAINS TO....

Cape Fear River (CFR)

Intracoastal Waterway (ICW)

Cape Fear River

Cape Fear River

Intracoastal Waterway

Intracoastal Waterway

Cape Fear River

Intracoastal Waterway

**Barnards Creek** – Barnards Creek drains into the Cape Fear River Estuary. There was only one station sampled in this watershed during 2005, lower Barnards Creek at River Road. This site had no algal blooms, BOD or turbidity problems; but it had poor water quality in terms of fecal coliform counts and low dissolved oxygen. It also had among the highest suspended solids, ammonium, total nitrogen and total phosphorus levels among all the local watersheds.

**Bradley Creek** – Bradley Creek drains the largest tidal creek watershed in the area (including much of the UNCW campus) into the Atlantic Intracoastal Waterway (ICW). Seven sites are sampled, all from shore. Turbidity was not problematic during 2004-2005. Dissolved oxygen was good to fair at all sites, except the branch at College Acres (BC-CA) where it fell below 5.0 mg/L on three occasions during summer. Elevated nitrogen and phosphorus levels enter the creek in both the north and south branches, and one minor and one major algal bloom occurred in the creek in the south branch (BC-SB) at Wrightsville Avenue. Fecal coliform bacterial samples were only collected at BC-CA, where contamination was excessive during six of the seven samples collected in 2005.

**Burnt Mill Creek** – Burnt Mill Creek drains an extensive urban area. (Burnt Mill Creek eventually empties into Smith Creek). The number of sampling stations on Burnt Mill Creek was increased from three to six in 2005, because of additional funding from the EPA 319 grant program through North Carolina State University. There were no turbidity or suspended solids problems in 2005, but the creek showed poor water quality in terms of substandard dissolved oxygen, with four out of six stations having dissolved oxygen concentrations below the State standard

> 25% of the time sampled. High fecal coliform counts were a problem, with five out of six sites exceeding the human contact standard > 25% of occasions sampled.

There were also some algal bloom problems at Anne McCrary Pond on Randall Parkway and at the Princess Place sampling station. The effectiveness of Ann McCrary wet detention pond as a pollution control device was poor during 2005. While the pond led to a significant reduction in fecal coliform bacteria and an increase in dissolved oxygen, it failed to reduce nutrient concentrations including ammonium, nitrate, total nitrogen, orthophosphate and total phosphorus. Several water quality parameters indicated a subsequent worsening of the creek from where it exited the pond to the downstream Wallace Park and Princess Place sampling stations.

The constructed wetland on Kerr Avenue led to a significant decrease in ammonium, but none of the other nutrient species. Fecal coliform bacteria counts did not decrease through the pond in 2005, nor did BOD. Sampling of the sediments for potential toxicants showed some problems with elevated lead concentrations, and problems with excessive concentrations of polycyclic aromatic hydrocarbons (PAHs) at all sites tested.



**Greenfield Lake** – This urban lake is sampled at three in-lake sites and at three tributary sites. The three tributaries of Greenfield Lake (near Lake Branch Drive, Jumping Run Branch, and Lakeshore Commons Apartments) all suffered from severe low dissolved oxygen problems. All three of the tributaries also had frequent high fecal coliform counts, and maintained geometric mean counts in excess of the state standard for human contact waters. There were also some algal bloom problems at the Jumping Run Branch sampling site.

In spring 2005 several steps were taken by the City of Wilmington to restore viability to the lake. In February 2005, 1,000 sterile grass carp were introduced to the lake to control (by grazing) the overabundant aquatic macrophytes. During that same month, four SolarBee water circulation systems were installed in the lake to improve circulation and force dissolved oxygen from the surface downward toward the bottom of the lake. Finally, from April through June, a contract firm applied Sonar herbicide to further reduce the amount of aquatic macrophytes.

These actions led to a major reduction in aquatic macrophytes lake wide. However, six algal blooms exceeding the state standard of 40 µg/L were recorded among the three in-lake sampling stations during July-September 2005 (an increase over the previous year). Despite the blooms, there was also an improvement in

dissolved oxygen concentrations over the previous two years, possibly through the use of the SolarBees. Fecal coliform bacteria pollution was a problem in the main lake, particularly at the park station. Thus, during 2005 Greenfield Lake was impaired by algal blooms, high fecal coliform counts and low dissolved oxygen concentrations, although there was definite improvement in dissolved oxygen concentrations compared with the previous two years. Whereas in 2004 average summer surface dissolved oxygen concentrations ranged from 2.9-6.8 mg/L, in summer 2005 average surface dissolved oxygen concentrations ranged from 8.2-9.9 mg/L.

**Hewletts Creek** – Hewletts Creek drains a large watershed into the Intracoastal Waterway, and is sampled by boat at four sites and from shore at eight sites. Hewletts Creek was impacted by two sewage spills during summer 2005. Nutrient loading from one of these spills (in July) caused two major algal blooms in the north branch (NB-GLR) and the south branch (SB-PGR) plus a minor bloom at SB-PGR.

There were several incidents of hypoxia seen in our regular monthly 2004-2005 sampling; two at NB-GLR, three at NWB and four at SB-PGR, and several additional incidents of hypoxia following the July sewage spill. The hypoxia from the spill also caused a large fish kill in the creek during the July 4th weekend, and subsequent mortality of



some ducks. Fecal coliform counts were low to moderate at the lower and mid-creek sites, and high in terms of the N.C. human contact standard of 200 CFU/100 mL at the north and middle branches, but moderate at the south branch. The sewage spills led to high July and September water column fecal coliform counts, and prolonged occurrences (over two months) of high fecal bacteria counts in the sediments of the upper branches of the creek.

Since January 2004, five non-tidal sites have been sampled in the Hewletts Creek watershed. One site is PVGC-9, draining Pine Valley Country Club. This stream had no dissolved oxygen, turbidity, or algal bloom problems, but relatively high nitrate levels. Fecal coliform bacteria counts exceeded State standards 86% of the time in 2005 at this station, an increase over last year. The other sites are being sampled to gain background information on the water quality of streams entering (DB-1, DB-2, DB-3 sampling stations) and exiting (DB-4) a proposed constructed wetland/future park area known as the Bethel Road/Dobo site, draining into the headwaters of Hewletts Creek. In 2005 all nutrient species had the highest concentrations at DB-1 and lowest at DB-2. There was some reduction of nutrients at DB-4 compared with DB-1, showing that the property already has some water quality

improvement function. The exception was nitrate, which had similar concentrations at DB-1 and DB-4. Dissolved oxygen was low only at DB-1, and turbidity was low at all four sites. Suspended solids concentrations were periodically elevated at DB-1, but low at the other three sites. Fecal coliform bacteria counts were a problem at all four sites, and were highest at DB-1 followed by DB-4 and DB-2. The data suggest that fecal coliform bacteria and nitrogen should be targeted in particular for removal by the constructed wetland treatment facility.



**Howe Creek** – Howe Creek drains into the ICW. Five stations were sampled in Howe Creek in 2004-2005. Turbidity did not exceed North Carolina water quality standards at any of the sampling stations. Dissolved oxygen concentrations were generally good in Howe Creek, with HW-GP below the standard of 5.0 mg/L on two occasions. Nutrient levels were generally low except for nitrate at HW-DT. Nitrate levels showed a decrease over levels in 2003-2004, especially at the uppermost stations, probably a reflection of lower rainfall and runoff. There was one minor algal bloom of 38 µg/L as chlorophyll a at HW-DT.

Since wetland enhancement was performed in 1998 above Graham Pond, the creek below the pond at HW-GP has had fewer and smaller algal blooms than before the enhancement. Fecal coliform bacterial abundances were low near the Intracoastal Waterway, moderate in mid-creek, and high in the uppermost station, with HW-DT exceeding the State standard on seven of twelve occasions sampled. The 2004-2005 data show an improvement in fecal coliform counts after a sharp decrease in bacterial water quality seen in 2003-2004. Less urban runoff as a result of the drought of 2005 may be responsible for the lowered counts.

**Smith Creek** – Smith Creek drains into the lower Northeast Cape Fear River just upstream of where it merges with the Cape Fear River. Two estuarine sampling sites on Smith Creek proper, SC-23 and SC-CH were sampled in 2005. Dissolved oxygen concentrations were below 5.0 mg/L on three of seven occasions at SC-23 and on four of seven occasions at SC-CH between June and September 2005. Thus, low dissolved oxygen continued to be a water quality problem in Smith Creek.

The North Carolina turbidity standard for estuarine waters (25 NTU) was not exceeded during 2005, an improvement over last year. Nutrient concentrations remained similar to last year's levels, and algal blooms exceeding the State standard were not found in 2005. However, lesser algal blooms of 35 µg/L and 25 µg/L occurred at SC-23

and SC-CH, respectively, in August, and a bloom of 25 µg/L occurred at SC-23 in July. Fecal coliform bacteria concentrations were above 200 CFU/100 mL on only one occasion (at SC-CH), an improvement over the past two years. BOD was sampled at SC-CH, with a mean value of 1.4 mg/L and a median value of 1.5 mg/L, similar to last year.

**Whiskey Creek** – Whiskey Creek is the southernmost large tidal creek in New Hanover County that drains into the ICW. Five stations are sampled from shore along this creek. Whiskey Creek had moderate nutrient loading but generally low chlorophyll a concentrations in 2004-2005, with the exception of one minor algal bloom. Dissolved oxygen concentrations were below the State standard on only one of twelve occasions at two sampling sites and high turbidity was not a problem. Fecal coliform bacteria were not sampled.

#### Glossary of Water Quality Terms

**Algal Blooms** Rapidly occurring growth and accumulation of algae in a waterway, which usually results from excessive nutrients and can result in low dissolved oxygen conditions.

**Aquatic Macrophyte** Large vascular, rooted aquatic plant; visible to the eye.

**Biochemical Oxygen Demand (BOD)** A measure of the amount of oxygen used by microorganisms to break down organic matter.

**Chlorophyll a** The green photosynthetic pigment contained in all living algae that can be directly measured and used as the primary indicator of algal biomass. *State standard: 40 µg/L*

**Dissolved Oxygen (DO)** The amount of oxygen available in the water. Aquatic organisms require adequate levels of DO to survive. *State standard: 5 mg/L*

**Fecal Coliform Bacteria** Bacteria that are present in the intestines or feces of warm-blooded animals. They are used as indicators of the quality of waterways.

*State standard for shellfish waters: 14 CFU/100mL*

*State standard for human contact: 200 CFU/100mL*

**Heavy Metals** Elements that are carried into waterways via urban runoff, that, in concentration, can harm living organisms.

**Hypoxia** Very low oxygen levels.

**Nutrients** Chemicals needed by plants and animals for growth (i.e. nitrogen and phosphorous). Excessive nutrients in waterways can lead to harmful aquatic weed and algae growth.

**Polycyclic Aromatic Hydrocarbons (PAHs)** A large class of chemicals generated by the burning of petroleum fuels, wood, or charcoal.

**Pathogens** Disease-causing organisms (i.e. bacteria, viruses).

**Sediment** Particles of silt, clay, or sand that wash into waterways as a result of human or natural weathering or land-disturbing activities. Sediment can settle to the bottom or remain suspended in water.

**Turbidity** A measure of how clear the water is. *State standard: 25 NTU (saltwater) and 50 NTU (freshwater).*

**mg/L** Stands for milligrams per liter.

**µg/L** Stands for micrograms per liter.

**CFU** stands for colony forming unit.

**NTU** stands for nephelometric turbidity unit.